

Cell Libraries

Silicon has historically been the material of choice for digital integrated circuits but there are faster and more energy efficient semiconductor materials on the horizon. One in which NASA is investing considerable research effort is gallium arsenide (GaAs). Electrons are conducted 4-6 times faster through GaAs than through silicon, which offers processor performance of 500 megahertz and above. This, coupled with advantages of lower power consumption at frequencies above 100-150 megahertz, makes GaAs a very attractive replacement for the silicon-based CMOS (Complementary Metal Oxide Semiconductor).

Though promising, GaAs has been slow to catch on. As a material, it is expensive, inherently brittle and easily damaged in fabrication and packaging. Perhaps the greatest drawback to its use as a mainstream semiconductor material has been the lack of computer automated engineering tools for designing GaAs integrated circuits as efficiently as CMOS chips.

What is described as a "breakthrough solution" to the gallium arsenide design automation problem has been provided by Systems & Processes Engineering

Corporation, Austin, Texas. Under funding from Goddard Space Flight Center, (GSFC), SPEC has developed a series of GaAs cell libraries that work as an extension to the integrated circuit design tools produced by COMPASS Design Automation, San Jose, California. The cell libraries are used for such operations as cell layout, design rule checking, logic synthesis, placement and routing, simulation and chip assembly. **Below** is an on-screen view of the physical layout of a gallium arsenide standard cell in the design process, as generated by the COMPASS tools using the SPEC GaAs libraries.

COMPASS, one of the leading producers of electronic design automation software, is marketing SPEC's GaAs cell libraries worldwide. The libraries are a byproduct of SPEC's contract with GSFC for design and development of a 500 megahertz GaAs version of Sun Microsystems' SPARC processor, intended for space applications and for terrestrial computer and communications systems. Developed by means of COMPASS tools and the SPEC libraries, the microprocessor is targeted to Vitesse Semiconductors H-GaAs III process technology.

